ELECTRICAL ENGINEERING (MENG)

Master of Engineering in Electrical Engineering
Unit: Speed School of Engineering (http://engineering.louisville.edu) (SP)

Department: Electrical and Computer Engineering (https://engineering.louisville.edu/academics/departments/electrical/)
Academic Plan Code(s): EE_ _MEN

Program Information

General Information
The Bachelor of Science in Electrical Engineering degree will provide a student with the basis to be able to complete the Master of Engineering (MEng) in Electrical Engineering degree. The Master of Engineering in Electrical Engineering degree program is accredited by the Engineering Accreditation Commission (EAC) of ABET (https://www.abet.org), under the Commission’s General Criteria and the Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.

Since the Electrical Engineering MEng is accredited as part of a five-year program with one-year of co-op experience, it is only available for students who have matriculated through the Electrical Engineering bachelor’s degree program at Speed School. Therefore, students who earn an undergraduate degree at a school or university other than the University of Louisville pursue the MS degree instead of the MEng degree.

Master of Engineering Program Educational Objectives
Graduates of the Master of Engineering program in the Electrical and Computer Engineering Department are expected within a few years of graduation to have:

a. Established themselves in successful and productive careers or advanced studies in electrical engineering or a related area, possess technical competency in electrical engineering, and are effective team members and effective communicators.

b. Demonstrated the ability to engage in lifelong learning in electrical engineering and related fields.

c. Acquired a sense of professionalism, with emphasis on professional ethics, an awareness of professional licensing, and participation in the affairs of the profession.

Master of Engineering Student Outcomes
In order to achieve these objectives, the Master of Engineering program in the Electrical and Computer Engineering Department has the following outcomes set for its graduates. Graduates will demonstrate:

a. An ability to communicate effectively with a range of audiences.

b. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Residency
All graduate students are expected to make steady and satisfactory progress toward the completion of degrees. A candidate for the Master of Engineering degree who does not register for credit hours must maintain active registration by paying a fee each semester for MEng residency until the degree is awarded (i.e., the candidate must maintain continuous registration, including summer terms, in Graduate Studies). Failure to pay the MEng residency fee will be cause to cancel a student’s residency. Students who are not enrolled for a period of more than 12 months will be considered to have withdrawn from the program. In order to be restored to residency, the student must submit a new application, have the recommendation of the department chair, receive the approval of the Associate Dean and pay the fee for each of the semesters during which the residency was void.

Academic Performance
The J.B. Speed School of Engineering has established the following performance policies:

a. The minimum grade point average requirement for good standing is 3.00 for all academic work completed while in graduate studies.

b. Any student with a cumulative graduate GPA below 3.00 will be placed on academic warning. Students on academic warning are limited to enrollment for thirteen (13) credit hours in a fall or spring semester and seven (7) credit hours for summer terms.

Students who do not bring their cumulative graduate GPA back at or above a 3.00 in the semester immediately following Academic Warning, will be placed on Academic Probation for the next semester of enrollment. Students on probation are limited to enrollment for thirteen (13) credit hours in a fall or spring semester and seven (7) credit hours for summer terms. Any student who remains in academic probation for two consecutive terms may be considered for dismissal from the program.

c. Students receiving graduate assistantships (teaching, research or service) shall be provided adequate training and shall be required to understand and adhere to University policies related to these areas. The performance of teaching, research and service duties by such students shall be periodically evaluated. Students with teaching assistantships shall be evaluated annually.

d. Students who fail to meet performance goals or who do not meet other requirements as outlined in the admission letter, program requirements or the university catalog may be subject to academic dismissal from their programs.

e. A maximum of eight (8) credit hours of graduate level courses taken as an undergraduate may be used to satisfy MEng degree requirements; these courses cannot have been used to also satisfy BS degree requirements.

Degree Requirements
The following degree requirements are mandatory of all Master of Engineering candidates:

a. The program of study must be completed with a 3.00 GPA or better for all graduate courses used to satisfy degree requirements. Additionally, the program of study must be completed with a 3.00 GPA or better for all academic work attempted in graduate studies.

b. Master’s degree students must take at least 24 credit hours of coursework at the University of Louisville to satisfy the residency requirement for the master’s degree. A maximum of six (6) credit hours of graduate credit may be transferred from accredited institutions.

c. Students following the thesis option must follow the Procedures and Standards for Master of Engineering Theses.

d. The total requirements must be completed within six years after admission into graduate studies. The time limit imposed by the rule may be extended in individual cases upon recommendation of the
department chair and approval of the associate dean for academic and student affairs.

e. The MEng degree cannot be conferred prior to the BS degree.

Admission Standards

Since the Electrical Engineering MEng is accredited as part of a five-year program with one-year of co-op experience, it is only available for students who have matriculated through the Electrical Engineering bachelor degree program at Speed School.

The application form is available online (http://louisville.edu/speed/academics/forms/MEngGraduateStudiesApplication/).

The requirements for admission or readmission to a Master of Engineering program are:

1. Submission of a completed MEng application for the field of specialization in which the student is earning a bachelor degree from the J.B. Speed School of Engineering. Students can be admitted to the MEng program with fewer than thirteen (13) credit hours of BS degree requirements remaining and no later than two years post conferral of their baccalaureate degree;

2. Recommendation by the faculty and chair of the student's department for admission or readmission to graduate studies;

3. Cumulative baccalaureate grade point average of 2.75. However, those students with cumulative baccalaureate grade-point averages from 2.50 to 2.75 may be admitted upon petition and approval of the chair and faculty of the department.

A student becomes a candidate for the Master of Engineering degree upon admission to graduate studies and initial registration as a graduate student.

Program Requirements

The Master of Engineering in Electrical Engineering degree requires the following over and above the Bachelor of Science in Electrical Engineering Degree.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ECE 510</td>
<td>Computer Design</td>
<td>4</td>
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<tr>
<td>&amp; ECE 511</td>
<td>Computer Design Laboratory</td>
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<tr>
<td>ECE 515</td>
<td>Introduction to VLSI Systems</td>
<td>4</td>
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<tr>
<td>&amp; ECE 514</td>
<td>Introduction to VLSI Systems Laboratory</td>
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<td>ECE 516</td>
<td>Microcomputer Design</td>
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<tr>
<td>ECE 520</td>
<td>Digital Signal Processing</td>
<td>4</td>
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<tr>
<td>&amp; ECE 521</td>
<td>Digital Signal Processing Laboratory</td>
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<tr>
<td>ECE 533</td>
<td>Integrated Circuit Design</td>
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<tr>
<td>&amp; ECE 534</td>
<td>Integrated Circuit Design Laboratory</td>
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<tr>
<td>ECE 543</td>
<td>Fundamentals of Microfabrication and MEMS</td>
<td>4</td>
</tr>
<tr>
<td>&amp; ECE 544</td>
<td>Microfabrications/MEMS Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECE 550</td>
<td>Communication and Modulation</td>
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<td>Communication Systems Laboratory</td>
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<td>ECE 555</td>
<td>Digital Image Processing</td>
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<td>&amp; ECE 556</td>
<td>Digital Image Processing Laboratory</td>
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<td>ECE 560</td>
<td>Control Systems Principles</td>
<td>4</td>
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<td>&amp; ECE 561</td>
<td>Control Systems Laboratory</td>
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<td>ECE 564</td>
<td>Fundamentals of Autonomous Robots</td>
<td>4</td>
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<tr>
<td>&amp; ECE 565</td>
<td>Fundamentals of Autonomous Robots Lab</td>
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<tr>
<td>ECE 619</td>
<td>Computer Vision</td>
<td>4</td>
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<td>&amp; ECE 645</td>
<td>Computer Vision Laboratory</td>
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<tr>
<td>ECE 620</td>
<td>Pattern Recognition and Machine Intelligence</td>
<td>4</td>
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<tr>
<td>&amp; ECE 655</td>
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<tr>
<td></td>
<td>Laboratory</td>
<td></td>
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<tr>
<td>ECE 633</td>
<td>Microelectronics Design and Fabrication</td>
<td>4</td>
</tr>
<tr>
<td>ECE 636</td>
<td>MEMS Design and Fabrication</td>
<td>4</td>
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<tr>
<td>ECE 697</td>
<td>Master of Engineering Thesis or Paper in Electrical Engineering</td>
<td>6</td>
</tr>
</tbody>
</table>

A maximum of eight (8) credit hours of graduate level courses taken as an undergraduate may be used to satisfy MEng degree requirements; these courses cannot have been used to also satisfy BS degree requirements.

1 Electives must be chosen so that at least one-half of the credits counted toward the degree, exclusive of thesis or paper, are 600-level.

2 A minimum of twelve (12) credit hours must be classified as Design Electives. Design Electives must be chosen from the approved list of regular courses (see below).

3 ECE electives must be chosen from an approved list

4 ECE 697 Master of Engineering Thesis or Paper in Electrical Engineering is an elective for a total of six (6) credit hours. For the thesis/paper option, a student is urged to select both an approved M.Eng. thesis/paper topic and the director and members of the thesis/paper committee during the first term of graduate studies. The thesis/paper director must give approval for enrollment in ECE 697.

5 Technical electives can be ECE or non-ECE courses. Technical electives must be approved by the department. A maximum of six (6) credit hours of non-ECE courses will count toward the MEng degree. Non-ECE technical electives must be approved by the department.

Design Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ECE 633</td>
<td>Microelectronics Design and Fabrication</td>
<td>4</td>
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<tr>
<td>ECE 636</td>
<td>MEMS Design and Fabrication</td>
<td>4</td>
</tr>
<tr>
<td>ECE 697</td>
<td>Master of Engineering Thesis or Paper in Electrical Engineering</td>
<td>6</td>
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### ECE electives

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ECE 500</td>
<td>Special Topics in Electrical Engineering</td>
<td>1-6</td>
</tr>
<tr>
<td>ECE 518</td>
<td>Fundamentals of Computer Communications and Networks</td>
<td>3</td>
</tr>
<tr>
<td>ECE 523</td>
<td>Introduction to Biometrics</td>
<td>3</td>
</tr>
<tr>
<td>ECE 526</td>
<td>LabVIEW for Electrical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ECE 530</td>
<td>Introduction to Random Processes and Estimation Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECE 531</td>
<td>Power Electronics</td>
<td>3</td>
</tr>
<tr>
<td>ECE 532</td>
<td>Electromechanical System Designs for Home Appliances</td>
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<tr>
<td>ECE 540</td>
<td>Fundamentals of Lasers</td>
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<tr>
<td>ECE 541</td>
<td>Engineering Optics Laboratory</td>
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<td>ECE 542</td>
<td>Semiconductor Device Fundamentals</td>
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<td>ECE 543</td>
<td>Fundamentals of Microfabrication and MEMS</td>
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<tr>
<td>ECE 545</td>
<td>Optical Signal Processing</td>
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<tr>
<td>ECE 569</td>
<td>Intermediate Electromagnetic Fields and Waves</td>
<td>3</td>
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<tr>
<td>ECE 581</td>
<td>Electric Machines and Drives</td>
<td>3</td>
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<tr>
<td>ECE 582</td>
<td>Power System Analysis</td>
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<tr>
<td>ECE 600</td>
<td>Special Topics in Electrical &amp; Computer Engineering</td>
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<tr>
<td>ECE 611</td>
<td>Computer Architecture</td>
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<td>ECE 613</td>
<td>Computational Intelligence Methods for Data Analysis</td>
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<td>ECE 614</td>
<td>Deep Learning</td>
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<td>ECE 632</td>
<td>Semiconductor Principles</td>
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<td>ECE 638</td>
<td>The MOSFET</td>
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<td>ECE 640</td>
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<td>ECE 641</td>
<td>Medical Imaging Systems</td>
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<td>ECE 642</td>
<td>Fiber Optics and Integrated Optical Systems</td>
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<td>ECE 643</td>
<td>Introduction to Biomedical Computing</td>
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<td>Communication System Design</td>
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<td>Information Theory and Coding</td>
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<td>Advanced Voice/Data Networks</td>
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<td>ECE 655</td>
<td>Pattern Recognition and Machine Intelligence Laboratory</td>
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<td>ECE 660</td>
<td>Introduction to Robust Control</td>
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<td>ECE 661</td>
<td>Sampled-Data Control Systems</td>
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<td>ECE 662</td>
<td>Introduction to Optimum Control</td>
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<td>ECE 664</td>
<td>Modern Adaptive Control</td>
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<td>ECE 665</td>
<td>Theory of Nonlinear Systems</td>
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<td>ECE 674</td>
<td>Nanotechnology</td>
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<td>ECE 675</td>
<td>Nanostructure Self-Assembly</td>
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<td>ECE 676</td>
<td>Foundations of Polymer MEMS</td>
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<td>ECE 682</td>
<td>Advanced Power System Analysis</td>
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